

The “CheckTools” Perspective

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Building Energy Codes Program
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Why do we do this?

42 USC 6833 (in part): ... **Technical assistance:** The Secretary shall provide technical assistance to States to implement the requirements of this section, and to improve and implement State residential and commercial building energy efficiency codes or to otherwise promote the design and construction of energy efficient buildings. ...

How do we do this?

- ▶ Provide technical assistance to states to implement national energy codes
- ▶ Provide software support to states to implement state energy codes
- ▶ Provide assistance increasing and verifying compliance
- ▶ Develop software to support a streamlined compliance process
- ▶ Provide objective information resources and technical guidance to states and localities to increase code compliance.

Early desktop software supported:

REScheck:

- MECcheck 1994: Supported Model Energy Codes 1992+, IECC 1998+
- Developed for and used by:
 - U.S. Dept. of HUD
 - Rural Econ. and Community Dev. (formerly Farmer's Home Admin)
 - CABO MEC users
 -

COMcheck:

- COMcheck-EZ (1997) - True Windows version released 1998
- COMcheck-Plus – 1999 – DOE-2 Limited Performance Simulation
- COMcheck 4.0.0 released 2015

Web presence:

- ▶ Energy Codes website started late 90's – platform for information and desktop tools
- ▶ REScheckWeb 2001
- ▶ COMcheckWeb 2002

Past and Present “Support Tools” :

- ▶ Package Generator
- ▶ “Score ‘N Store”
- ▶ U-factor calculator
- ▶ CodeCheck
- ▶ Energy code Tax credit app (<https://energycode.pnl.gov/EnergyCodeReqs/>)
- ▶ Lighting fixture library (COMcheck only)
- ▶ “AreaCalc” (REScheck only)
- ▶ Fan system compliance “wizard” (commercial only)
- ▶ Data exchange of project files between desktop and web
- ▶ Inspection checklists (UI interactive format and PDF)

Currently Supported Energy Codes

National Codes: 3 code cycle support

- ▶ RES: IECC 2009/2012/2015
- ▶ COM: IECC 2006/2009/2012, ASHRAE 90.1-2007/2010/2013

State codes:

Adoption Criteria

- ▶ Based on latest national code in the software
- ▶ More stringent than the base national code
- ▶ Advances code coverage/adoption that can be leveraged by other state codes

State Code Challenges:

- ▶ Alignment of state code adoption and CheckTools development or 3 code-cycle
- ▶ Grace periods allowed by state codes don't play well with web apps
- ▶ State energy code requirements can be contradictory and/or poorly defined

Currently Supported State Energy Codes

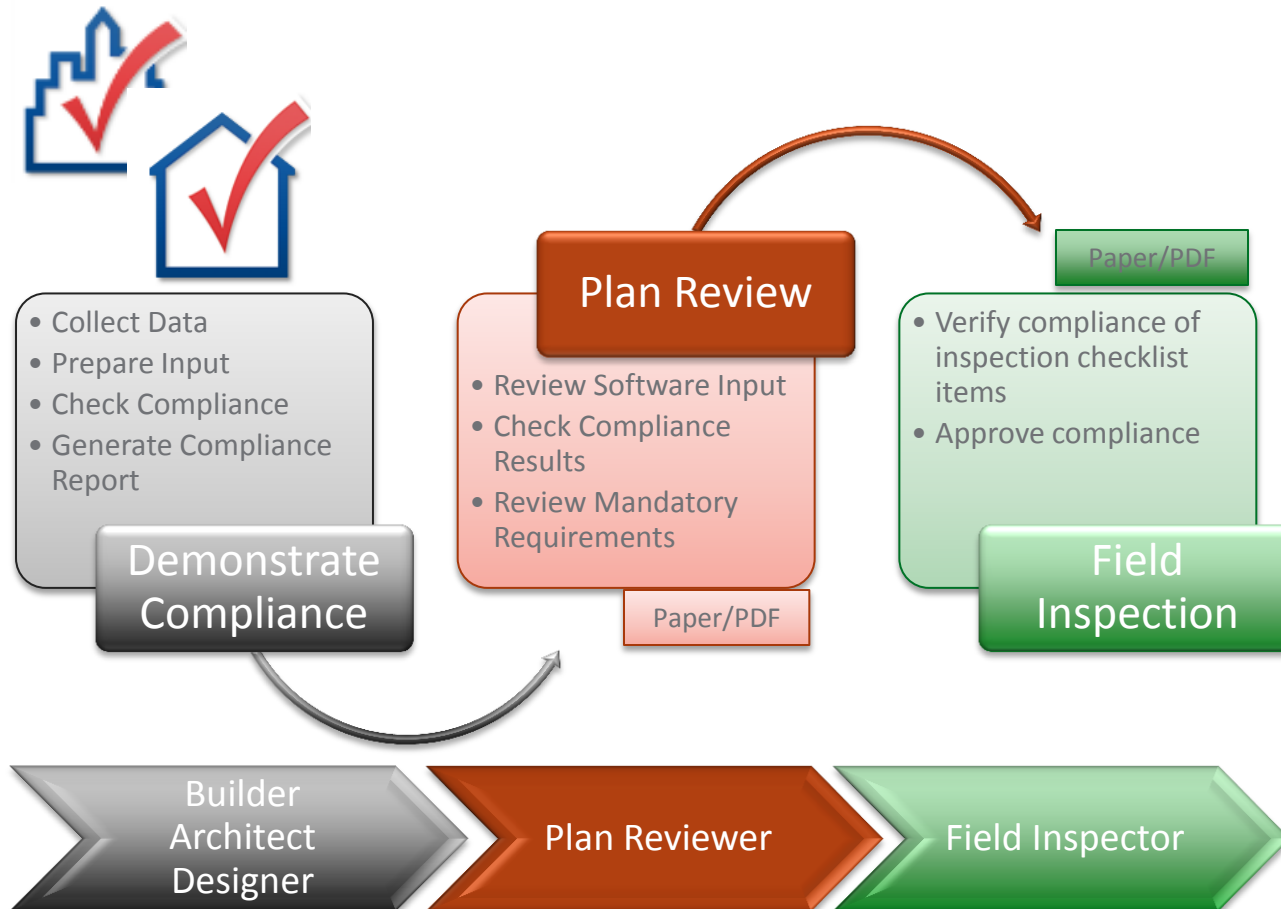
COMcheck:

New York
North Carolina
Ontario (CA)
Oregon
Puerto Rico
Vermont

REScheck:

Florida
Georgia
Illinois
New York
North Carolina
Puerto Rico
Utah
Vermont
Washington
Wisconsin

CheckTools Current Use Scenario



BECP Tools used only during “Demonstrate Compliance” Stage

Envelope Compliance Alternatives

COMcheck:

- ▶ New construction and Additions:
 - Trade-Off:
 - ASHRAE 90.1 (Pre-2013) Normative Appendix C Methodology for Building Envelope Trade-Off Option
 - ASHRAE 90.1-2013 Appendix C has limited performance method (EnergyPlus)
 - 2015 IECC Component Performance Alternative (Total UA)
 - Prescriptive: Oregon
- ▶ Alterations: Prescriptive Only

REScheck:

- ▶ New construction / Additions:
 - Total UA trade-off methodology
 - Limited performance methodology – DOE-2
- ▶ Alterations:
 - Total UA trade-off methodology
- ▶ 2015 IECC Additions/Alterations: Prescriptive alternative

COMcheck Compliance

Building System

Compliance Options

Envelope

Lighting

HVAC

SWH

Power

Other

Mandatory Provisions
(required for most compliance options)

Prescriptive Option

Trade Off Option

Energy Cost Budget

Simplified

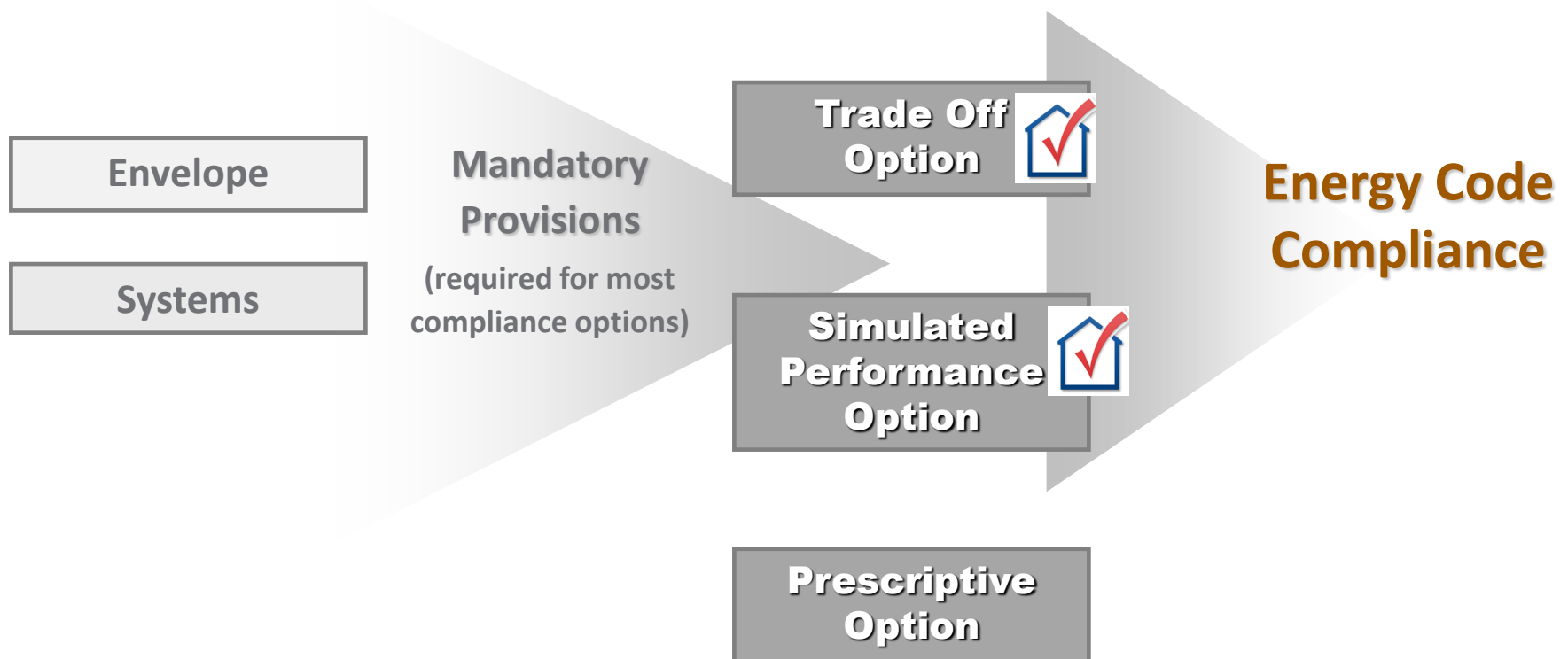


Energy Code Compliance

REScheck Compliance

Building System

Compliance Options



Untitled.xml - COMcheck 4.0.0 Code: 90.1 (2013) Standard

File Edit View Options Code Help

Project Envelope Interior Lighting Exterior Lighting Mechanical Requirements

Location
State: Tennessee
City: Nashville
Climate zone: 4a

Project Type
☒ New Construction ☐ Addition ☐ Alterations

Project Details (optional)
Edit Project Details... This information will appear on the compliance certificate.

Title/Site/Permit
Owner/Agent
Designer/Contractor
Notes

Check Envelope Compliance Help... Envelope TBD

Building Envelope Area Types Interior Lighting Method and Areas Exterior Lighting Areas

Add Delete Duplicate

	Building Type	Area Description	Area	W/ft2	Space Condition
1	Click to select building type.				Nonresidential

“DESKTOP”

WEB

COMcheck-Web - 2012 IECC - Internet Explorer

Project title
2012 IECC

Email Address Password Log In
Register Forgotten Password?

New Project PROJECT ENVELOPE INT. LIGHTING EXT. LIGHTING MECHANICAL REQUIREMENTS Reports

Code/Location
Code: 2012 IECC
State: Alabama
City: Abbeville
If your location is not included here, choose a nearby location with similar weather conditions.

Project Type
☒ New Construction ☐ Addition ☐ Alterations

Compliance Options
Efficiency: Unspecified

Space Conditioning Type(s)
☒ Nonresidential ☐ Residential

Project Details (optional)
This information will appear on the compliance report. Edit Project Details...

Notes

Building Use
☐ Building Area Method ☒ Area Category (Space-By-Space) Method

Add Area Category Edit Delete

	Area Category	Area Description	Area	Ceiling Height	W/ft ²
1	Double-click to select an area category.				

Total Area: 0

Exterior Lighting Areas
Zone: Unspecified

Add Exterior Area Duplicate Delete

	Exterior Lighting Area	Area Description	Quantity	W/Unit	Tradable

CHECK COMPLIANCE To display compliance results, click the Check Compliance button.

https://energycode.pnl.gov/COMcheckWeb/details.html#projectDetails 100%

“DESKTOP”

WEB

Untitled.rdl - REScheck 4.6.0 Code: 2012 IECC

File Edit View Options Code Tools Help

Front Faces: Unspecified

Project **Envelope** **Mechanical** **Requirements**

Location
State: Tennessee
City: Nolensville


Project Type
☒ New Construction ☐ Addition ☐ Alteration

Building Characteristics
☒ 1- and 2-Family, Detached ☐ Multifamily
Conditioned Floor Area: 0 ft²
☐ All ducts and air handlers located within conditioned spaces
[Explanation of duct testing requirements...](#)
☐ Project includes a thermally isolated sunroom
☐ Project includes a pool or inground permanent spa
☐ Project includes an interior wood-burning fireplace

Project Details (optional)
This information will appear on the compliance certificate.
[Edit Project Details...](#)
Title/Site/Permit
Owner/Agent


Designs

Notes

 Invalid conditioned floor area (see project screen)

Compliance Method: Performance Alternative [Explanation of results...](#)

If you can't find the building's city, choose a nearby city that has similar weather conditions.

 Project title: 2009 IECC

[New Project](#) PROJECT ENVELOPE MECHANICAL Reports

[Email Address](#) [Password](#) [Log In](#)
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Code/Location
Code: 2009 IECC [What's my code?](#)
State: Colorado
City: Denver
County: Adams
If your location is not included here, choose a nearby location with similar weather conditions.

Project Type
☒ New Construction
☐ Addition
☐ Alteration

Compliance Method
☒ UA Trade-Off
☐ Performance Alternative

Building Characteristics
☒ 1- and 2-Family, Detached
☐ Multifamily

Conditioned Floor Area 1500 ft²
☐ All ducts and air handlers are located within conditioned spaces
[Explanation of duct testing requirements](#)

Project Details (optional)
This information will appear on the compliance report. [Edit Project Details...](#)
Notes:

[CHECK COMPLIANCE](#) (To display compliance results, click the Check Compliance button.)

COMcheck Interior / Exterior Lighting

- ▶ Mandatory requirements
- ▶ Lighting power requirements
 - Complies if total connected power is less than lighting power allowance (entire building or partial)



≤



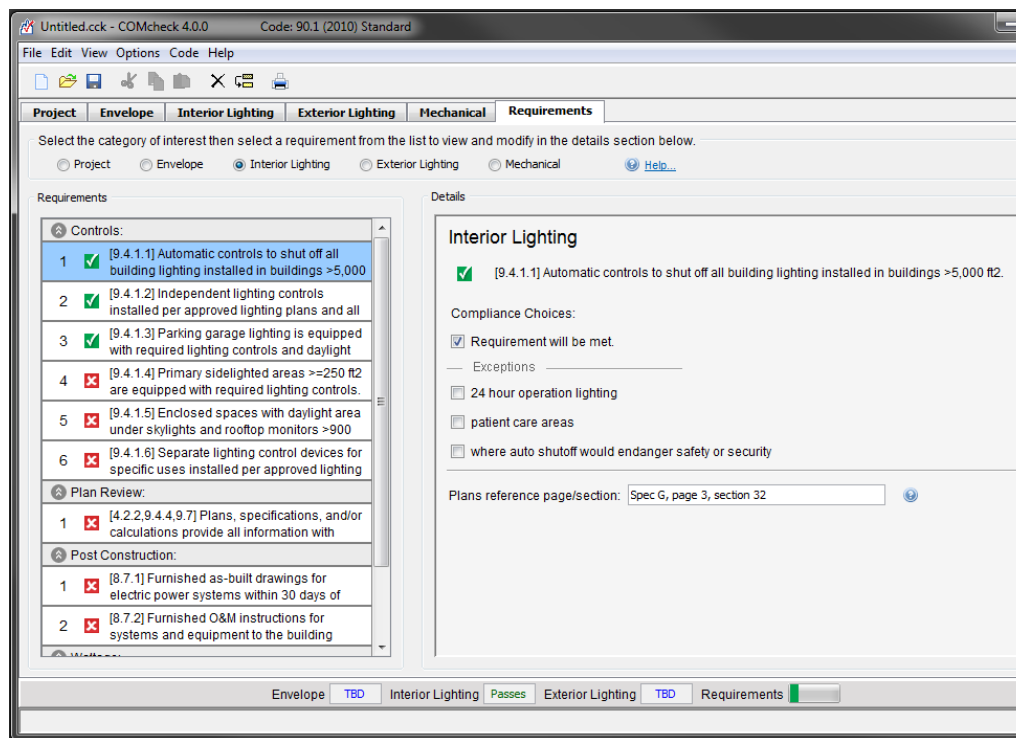
COMcheck Mechanical Equipment

- ▶ Different than Envelope and Lighting
- ▶ System types:
 - HVAC system
 - Plant
 - Water heating
- ▶ System inputs determine which requirements apply (“Customized” list of requirements)



Requirements Tab – Goals

- ▶ Ensure user is aware of applicable mandatory requirements and addresses each in the software
- ▶ Provide better documentation for code officials



COMcheck:

Compliance Certificates

- Envelope
- Interior Lighting
- Exterior Lighting
- Mechanical

RESCheck:

Compliance Certificate

Inspection Checklist

Panel Certificate

Inspection Checklists organized by phase of inspection

- Plan Review
- Footing/Foundation
- Rough-in
- Final

Reports – Inspection Checklist



COMcheck Software Version 3.9.2

Inspection Checklist

Requirements: 25.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

90.1 (2010) Standard	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10] ²	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
9.4.1.1 [EL1] ²	Automatic controls to shut off all building lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.2 [EL2] ²	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.3 [EL11] ²	Parking garage lighting is equipped with required lighting controls and daylight transition zone lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.4 [EL12] ¹¹	Primary sidelighted areas ≥ 250 ft ² are equipped with required lighting	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not	

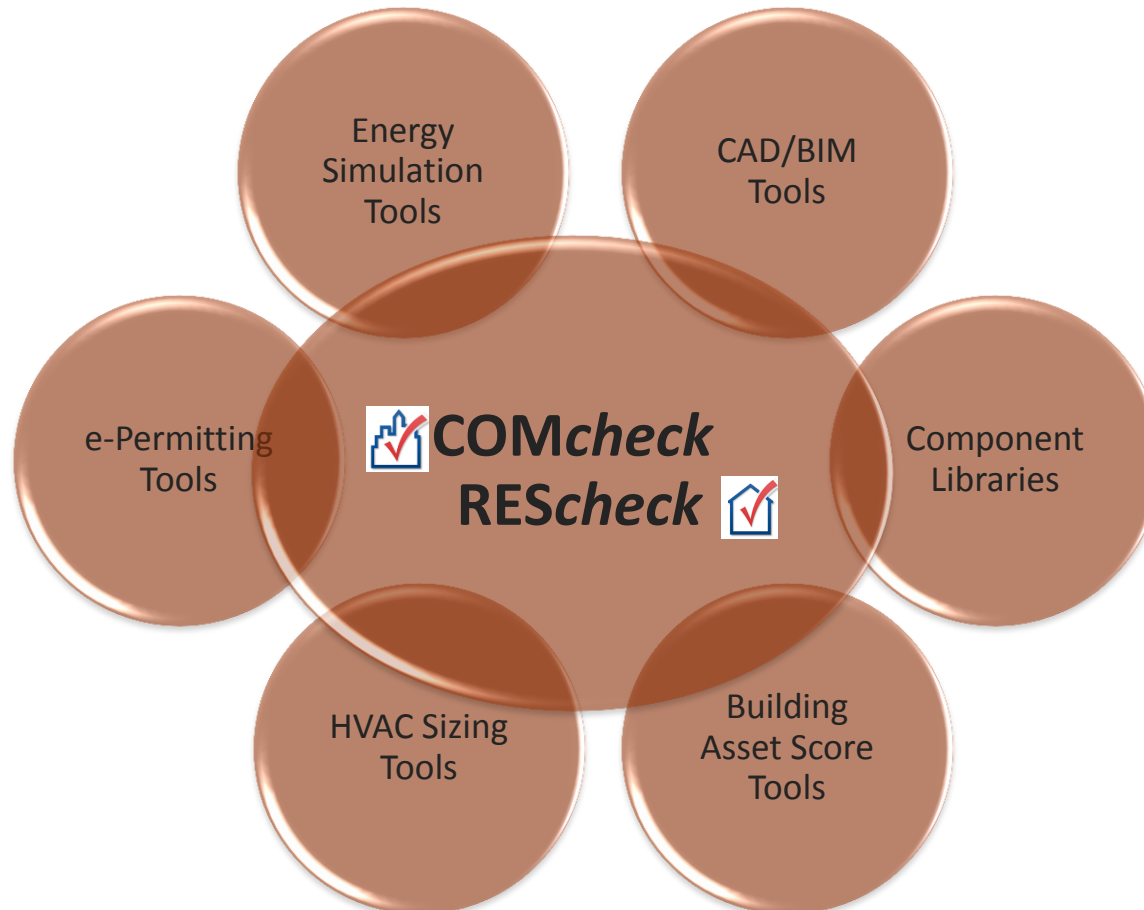
CheckTools Limitations

- ▶ “Deemed-to-comply” – Deemed to meet the intent of the code
- ▶ Prescriptive compliance capability limited
- ▶ Not all exceptions/allowances can be supported
- ▶ Nonstandard assembly types – U-factor calculations/documentation required
- ▶ Geometry/envelope design details limited
- ▶ Mechanical system configurations complex
- ▶ Energy code copyright constraints

Future Development

- ▶ More dynamic compliance: prescriptive->trade-off->performance:
One-stop-shop
- ▶ Interoperability and standardization
- ▶ Reduce the “deemed-to-comply” provisions
- ▶ Customization of inspection checklists
- ▶ Statistical sampling process for selective compliance inspection
- ▶ More product library support: e.g. NFRC, lighting fixtures/products, etc
- ▶ Code official Mobile checklist access
- ▶ ePermitting

Compliance Tools Interoperability Potential



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DEVELOPMENT

ADOPTION

COMPLIANCE

REGULATIONS

RESOURCE CENTER



ENERGY CODES IN ACTION!
 Join us March 23-26, 2015, for the DOE National Energy Codes Conference in Nashville, Tennessee, for the first national conference dedicated solely to energy codes since 2011!
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HIGHLIGHTS

- [Residential Energy Code Field Study](#)
- [Training Materials for the 2015 IECC and Standard 90.1-2013](#)
- [Notice of Preliminary Determination for the 2015 IECC](#)
- [Determination for ANSI/ASHRAE/IES Standard 90.1-2013](#)
- [HERS and IECC Performance Path](#)

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Popular Links

Tools 

[!\[\]\(78a029b04ee0ee05998c29299c47b06c_img.jpg\) **COMcheck**](#)
[!\[\]\(268d17a79f5913c36d8998dd535a8ce6_img.jpg\) **REScheck**](#)

Technical Assistance 

[!\[\]\(e0ab9361813163532c7fa95515d4d1b8_img.jpg\) **Help Desk**](#)

Status of State Energy Codes 



News 

- [Energy Codes Boost Development](#) 
 Source: [SEEA](#), posted: 01.26.2015
- [The Role of Building Energy Codes in the Clean Power Plan](#) 
 Source: [ACEEE](#), posted: 01.23.15
- [Energy Codes for Ultra-Low-Energy Buildings: A Critical Pathway to Zero Net Energy Buildings](#) 
 Source: [ACEEE](#), posted: 12.17.14
- [Getting to Zero Buildings Database](#) 
 Source: [SustainableBusiness.com](#), posted: 12.11.2014

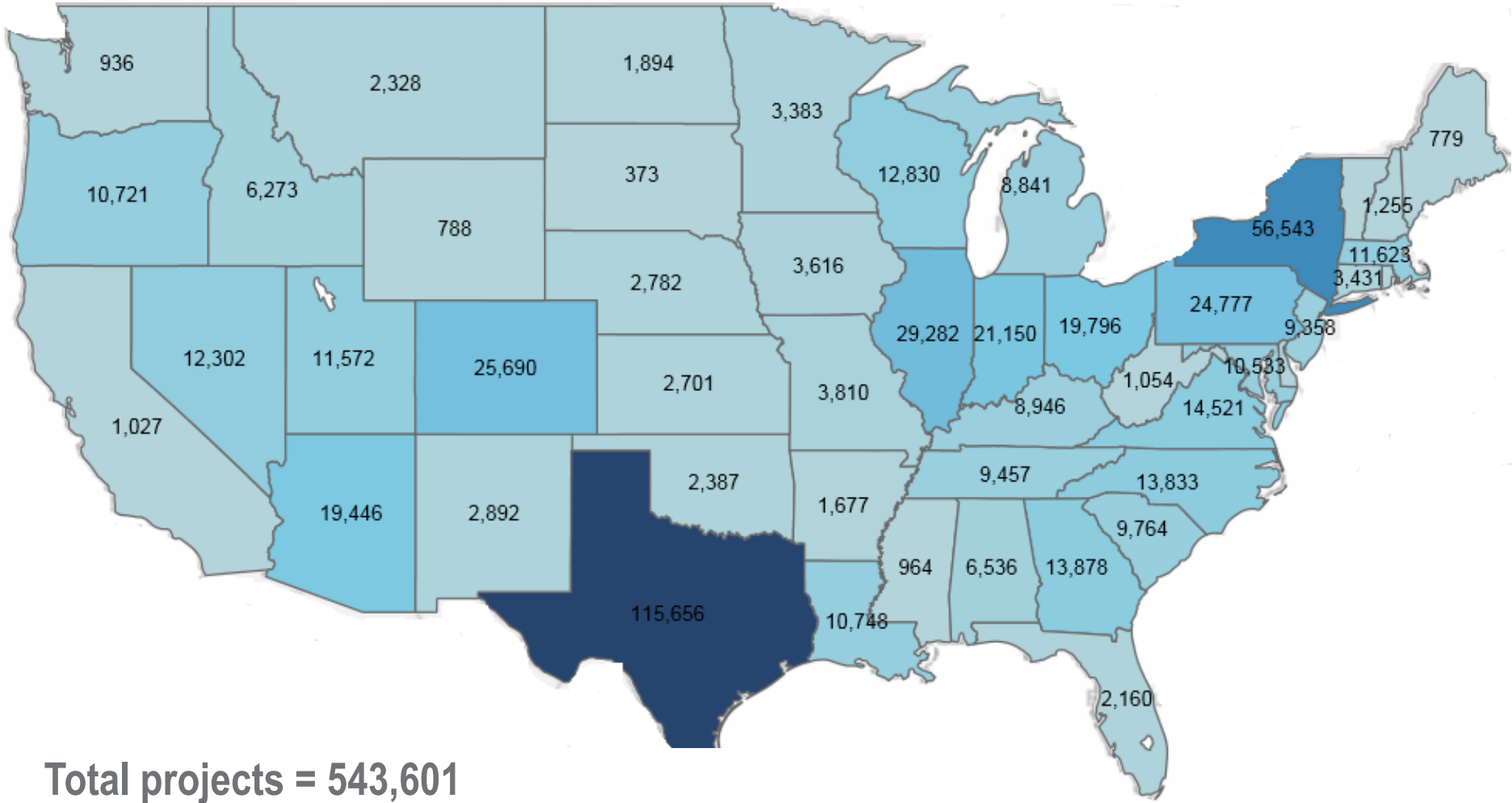
Social Media 





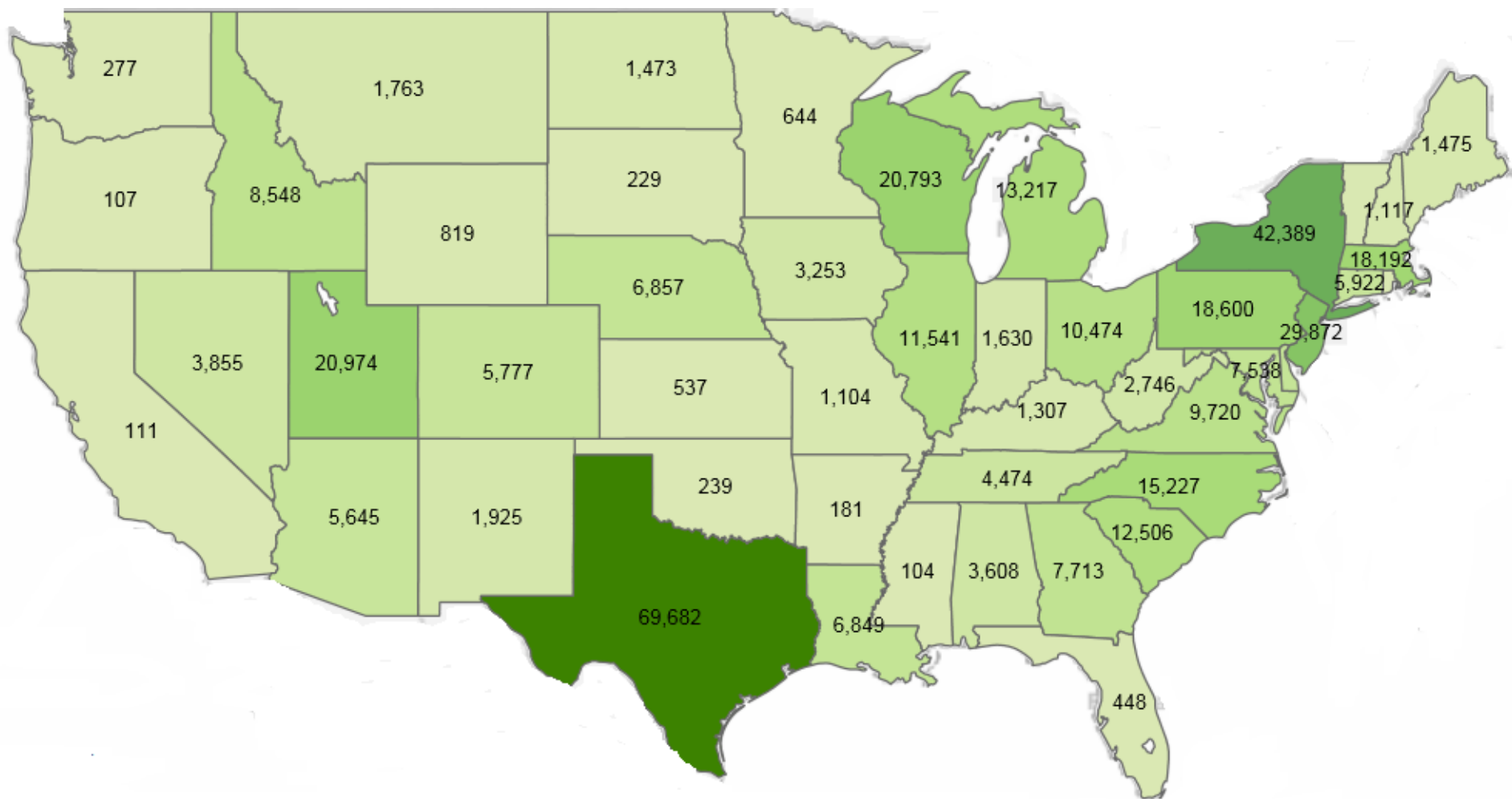

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COMcheck Projects by State (3/2012 – 2/2015)



Total projects = 543,601

REScheck Projects by State (3/2012 – 2/2015)



Total projects = 417,361